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Land Redistribution and Poverty Effects: A Study of South Africa

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Abstract:

South Africa's land grant program was established in 1996 to racial inequality in land holdings. Valente (2009) found participation reduces food security levels, a finding inconsistent with the wider literature. Using OLS and propensity score matching models, I analyze the Labor Force Survey between 2001-2004, estimating the program's effect on poverty. The data contains key variables such as participation in the redistribution program, household expenditure, and food security. The data also contains indicators of race, province, gender, age, education and farming reason. Results suggest program participants are worse off than non-participants, consistent with previous research.

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Land ownership in developing countries is often marked by a skewed distribution between races and classes. Land reform is often an attractive policy because of the potential to address both equity and poverty reduction at once. Equity of land holdings is the ideal end result of any redistribution program by definition, and the resulting distribution of resources is expected to lead to improved livelihoods of recipients. If these reforms are targeted towards the poor – who are most likely to participate in such a program –poverty reduction is the expected result. As such, many governments have pursued and implemented reform programs to promote these goals. However, whether these programs are effective should be considered to ensure an efficient use of resources. Therefore, this paper examines if participation in a land redistribution program improves the livelihoods of beneficiaries.

Land ownership in South Africa is marked by such distributional inequality. In the early 1600's, British and Dutch settlers began to arrive in the Cape of Good Hope – seizing ever-increasing tracts of land. As the settlers moved inland, they began to force the native African population into smaller and smaller reserves. The 1913 Land Act solidified the trend, forcing the black population to live in Bantustans, or "Homelands," which accounted for approximately 10% of the countries available land (Lahiff, 2007; Valente, 2009).

As a result the minority 10% of the country owns the vast majority of the country's land, resulting in a highly unequal distribution of wealth and income. "In 2001 the proportion of people living under the poverty line in South Africa was 57%" (Lahiff, 2007). When the apartheid regime fell in South Africa, and the country

transitioned into a full democracy in 1994, the new leaders sought to address the large-scale poverty and landlessness of the population (Hall, 2010). South Africa did so with the implementation of a land reform program designed to promote racial equity in land and to additionally address poverty. However, there are questions of efficiency as well as effectiveness about the South Africa program, especially since the program is suspected of not benefiting participants and "relatively little high value land has been transferred to date" (Lahiff, 2007). This motivates the question of whether or not participation in South Africa's redistribution program is increasing household expenditure, or reducing the incidence of poverty and food insecurity among participants.

Few empirical studies have been performed on the South African program. This is due perhaps to data limitations. There are few sources of data regarding the country's land grant program. For this paper Statistics South Africa's Labor Force Survey between 2001 and 2004 is used to examine the link between poverty, household expenditure, food insecurity, and participation in the land grant program. This paper will use these indicators as measures of well-being assuming that households that spend more and are less food insecure are less likely to live in poverty.

Background

Post-*apartheid* South Africa quickly put in place a land policy with three main goals: to restore land to those dispossessed after 1913, to secure formal tenure rights for those already occupying land, and to redistribute thirty percent of

agricultural land from white farmers to black citizens (Hall, 2010; Lahiff, 2007; Valente, 2009). The program has revolved around limited state intervention and market forces by providing grants to participants to purchase land from existing owners.

The 1996 Constitution protected the existing property rights of the white minority, limiting the ability of the government to pursue redistribution by expropriation. The program implemented rests on the idea of market oriented willing-seller willing-buyer. The government provides grants to those seeking to purchase land, but will not coerce current property owners to sell (Department of Land Affairs, 1997; Hall, 2010; Lahiff, 2007). This possibly limits the amount and quality of land transferred to new owners, as existing owners will hold onto the best land.

The Settlement Land Acquisition Grant provided up to R 15,000 ($2,148 in 2000 dollars) to potential farmers to purchase land for agricultural cultivation. The program had a rocky start, redistributing only approximately one percent of land in the first two years (Lahiff, 2007). Some issues encountered were expected, such as institutional learning as many bureaucrats were new to government. However, other issues were that grants were small and government regulation prohibited the break-up of large parcels of land. The result was that individuals had to pool their grants with a large group in order to afford most purchases (Hall, 2010; Lahiff, 2007; McCusker, 2002). These sometimes unwieldy organizations required collective farming, possibly resulting in lower benefits for participants.

Recognizing these issues, in 1999 the program was reformed and renamed the Land Redistribution and Agricultural Development program. Changes were made to provide a larger grant (between R20 000 to R100 000); to allow farming on any scale, and to remove the income cap thus opening the program to more affluent blacks (Hall, 2010; Lahiff, 2007). Significant changes were made to the program, however as implemented much remained the same (Hall, 2010; Lahiff, 2007). As such, benefits from the program are thought to remain limited.

To date, South Africa has only redistributed approximately five percent of the commercial agriculture land held by white farmers in 1994, far short of the goal of thirty percent (Valente, 2009). The Labor Force Survey between 2001 and 2004 indicates that 2.2% of the population is participating in the program. If benefits to participation exist, then more households are expected to participate. Thus, it is important to address whether there are benefits to participating in the land redistribution program.

Literature Review

A popular remedy to unequal distribution of land across households has been to reform possession. The success of these programs should be measured not only by their absolute number of land parcels redistributed, but also by whether participation has improved the lives of the participants. If programs do not benefit participants, then there may be more efficient uses of time and resources to reduce poverty and increase equity.

The theory behind land redistribution is that the formerly landless (and most likely impoverished) will be able to create new wealth for themselves (Besley & Burgess, 2000; Field, 2007; Lahiff, 2007; Valente, 2009). The possession of a valuable asset allows the household increased economic options to improve their economic standing (Deininger, Hoogeveen, & Kinsey, 2004). Land can be used to raise crops or graze livestock, or optimal use might be to sell or rent the land to others for income. This, theoretically, reduces the poor's dependence on government welfare.

A counter argument is that a more efficient program would simply provide grants to the poor to use without conditions. This would be similar to cash transfers made famous by Brazil. If participants were to purchase land, then that would be in their best interest. However, as governments are also promoting ideas such as racial equity of land possession, cash transfers are not as attractive as a policy choice. In addition, if the distribution of land in itself limits economic growth in other ways, then redistribution is also a better option.

Land reform may take several forms including restitution, title/tenancy reform, or redistribution. Tenancy reforms are the most common means through which to redistribute land ownership. These often take the form of transferring titles from large, distant, or state owners to the households that actually work on the land. This is commonly referred to as "land to the tiller" reform (Lahiff, 2007). Tenants with insecure property rights, such as urban squatters in Peru, or victims of weak legal systems in India, benefit by being able to collect more of the rents from their land/labor (Besley & Burgess, 2000; Field, 2007). By allowing them the

security of knowing that they will not be evicted, less rents are paid to landlords and longer term planning can occur. In addition, home security is no longer a chief worry allowing beneficiaries to work outside the home, as after Peru's titling program. This has lead to clear benefits to participants in the form of: more labor hours, less child labor, higher incomes, and less food insecurity.

Similar results have been found in the Central Asian states of Tajikistan and Uzbekistan. Formerly a part of the Soviet Union, these countries have highly concentrated land ownership by the state. Unlike in India, where land is owned by the state but independently farmed, production operations in the former Soviet countries were state directed (Z. Lerman and Sedik, 2009; Z. Lerman, 2008). Collective farms in these countries dominated the market, providing nominal employment to all, but producing relatively little. Household plots in Uzbekistan accounted for "only three percent of arable land [but] consistently accounted for 20-25 percent of [the country's] gross agricultural product" (Z. Lerman, 2008) while in Tajikistan "agricultural land in [household] plots is utilized 20-50 times more productively" than collective property (Z. Lerman & Sedik, 2009). As such, reforms were aimed at allowing individuals to remove land from collectives for private operation. The market-oriented reforms have benefited the program's participants with larger incomes, and greater crop yields. This in turn has lead to less food insecurity and an improved standard of living.

Tenure reforms reduce the costs of an unsure legal status or improve production using more local control and market influences. These costs manifest in several ways. In Peru, they were the time costs of having someone protect the home

against invaders (Field, 2007). In India, it was the cost of paying rents to landlords and middlemen (Besley & Burgess, 2000). In former Soviet states, reform has allowed individuals to respond to market forces and make production decisions. Reducing these costs by giving formal title or residency increases the income of the participants, at times without necessitating a change in the participant's behavior (Besley & Burgess, 2000). The key to these programs is that they have allowed households/individuals to reallocate their resources more efficiently. The resulting increase in income, in these cases, leads to a decrease in food insecurity and a greater ability to meet household needs.

Land redistribution programs that give land to those who are not currently, or have not recently farmed is a more scarcely found policy option. In Zimbabwe, such a program was implemented after liberation from colonial rule in 1980 (Deininger et al., 2004). The Deininger and Klaus (2004) study of the Zimbabwe program found that participants saw an average annual increase in household expenditure of US$17. While small, participants were seeing benefits attributed to their participation in the program.

A positive benefit to participants would be the expected result from South Africa's program, but the literature suggests the opposite. A study by Valente (2009) found participants to be less food secure than non-participants. It was found that "beneficiaries are still significantly more likely to report difficulties in satisfying their food needs than non-participants by between 8.4% and 10.2%-points" and that participants' "endowments would have been better rewarded in terms of food security should they not have taken part in land reform" (Valente, 2009, p. 1546).

This study finds that non-beneficiaries are better off than participants, and suggests that participants might have been better off not participating in the program. This is contrary to the wider literature on land reform programs.

Case study results are consistent with Valente's findings. A study of the Community Property Associations (CPA's) - groups of participants who have pooled their grants to purchase land – and projects in the Northern Cape found that most participants are not seeing higher incomes as a result of involvement in the program (Bradstock, 2005; McCusker, 2002). Most individuals in these studies spent little time on the farm, collective meetings were only attended by a third of the membership, and members pursued employment in other areas to increase their income. Time spent for other jobs reduces the time for farming and so reduces the gains from participation (Bradstock, 2005). It is also suggested that limited returns to involvement in the program increases disenchantment, and encourages individuals to stop participating in running/operating the farm. Ultimately, the literature on South Africa shows that participation in the land grant program does not benefit the individual/household. Instead, participants are more food insecure than they would otherwise have been, and income is not increased.

The literature contains contradictory results. In most countries, land reform has had a positive effect on the welfare of participants, though reform has mostly taken the form of tenure rights. Yet in South Africa, the effect is found to be either non-existent, or negative. This paper will further examine the relationship between participation in the land grant program and household expenditure, food insecurity, and poverty.

Data

The data for this paper comes from the Labor Force Survey by Statistics South Africa, the national statistics office. Observations are both on the household and the individual level. A section of the survey is dedicated to questions regarding the household. These include material possessions (e.g. telephone, television, car), as well as aspects of the home (e.g. material of walls/roof). There are also several sections regarding the individual (i.e. work status, personal information, education). Each individual in the data set is identified with a household. The 2001 to 2004 waves of the survey are pooled together to create a cross-sectional data set.

To analyze the effects of participation, this paper will focus on household level data, with individual observations of the head of household (HOH). Individual data for each respondent cannot be used because of the wording of the question on participation in the land grant program. The question reads "Have you or anyone in the household…" so using all respondents to the survey could result in double counting. One concern about using the household is that household composition is dynamic, and so identification of participation in the program could be for a respondent who was not a member of the particular household at the time of participation. However, given that the program was only in effect for between 4 and 8 years when the responses were taken household change less likely. Using the HOH for individual indicators is appropriate, as they are most likely earning the most income or direct the economic decisions of the household. As such, they would be most important in making the decision to participate in the land grant program.

Dependent Variables

This paper will examine the effect of participation in the land grant program on three measures of welfare: household expenditure, poverty, and food insecurity. The coding of household expenditure makes it difficult for detailed analysis as it is not a continuous variable, but asks respondents to place their expenditure within a range of values (See Table 3). In addition, the expenditure variable does not account for household production. However, using the median values of each bin in a regression analysis, it will provide a rough view of the relationship between participation and expenditure[1]. In addition, per capita household expenditure is constructed for a further analysis providing a second method of control for household size.

For a more detailed analysis, I will use the probability that a household lies below the poverty line. This is a constructed binary variable using the official poverty line developed by the South African Treasury Ministry and Statistics South Africa (Statistics South Africa, 2007). Poverty is defined as having less than R322 ($46.11). This per capita household expenditure measure is slightly crude. Each household that identified in the lowest bin of expenditure (R 0-400) is captured as living under the poverty line. However, households with one member who identify in this bin may spend above the poverty line but be captured as being in poverty. Yet, this variable will allow for a broader measure than expenditure, and it another means to evaluate the policy.

[1] All values are adjusted for inflation using 2000 as the base year.

The final dependent variable used is food insecurity. Each household is asked to report if they have had difficulty meeting their food needs within the last year. While self-reporting can at times be difficult, with food insecurity it is less likely to be subject to measurement error (Valente, 2009). The available responses are: never, rarely, sometimes, often and always. For this analysis, every household that reports sometimes, often or always is classified as food insecure. This follows the analysis of Valente (2009) and Deninger (2004). Households that are more food insecure are assumed to be poorer than food secure households.

Control Variables

In order to minimize any variable bias in the relationship between participation and expenditure, poverty, or food insecurity I will also include a series of controls. These are: race, province of residence, age, the education level of the head of household, household size, children under age 15, and the reason for farming. Reason for farming is a categorical variable capturing the household's main purpose in farming. Responses are: as a source of food, as a source of income, as extra sources of food or income, or as a hobby. Each reason is controlled for as a separate binary variable. Including this control allows a means of holding constant how serious the household is about farming. Households that use farming as a source of food or income are likely to work harder or emphasize time spent on the farm more than individuals who are farming as a hobby. Therefore it is an attempt to control for some unobserved characteristics regarding participants in the program.

The data are limited in two key ways. First, the question of participation does not include a date of when the grant was received. This excludes any before and after analysis of the benefits to participation. It also precludes discussion or examination of lagged benefits. If, for example, it takes three years for benefits to involvement to accrue, this cannot be seen in the data. Second, the survey is designed to study labor participation, not the land grant program. Therefore questions pertaining to participation in the program such as: hours spent farming, loans for the farm, land use, crop yield, farm income, or access to extension services (on site training) are not present. Despite these limitations, the LFS is a useful data set through which to study the South African redistribution program.

Methodology

To obtain a full analysis of the program's effect on poverty, three separate models will be used. First an Ordinary Least Squares (OLS) regression will provide a broad analysis of participation's effect on household expenditure. A probit equation will model the effect of participation on the likelihood of being food secure and below the poverty line. Finally, a basic propensity score match (PSM) will allow a comparison of like households by matching the probability of participation in the program. Using the match, the average treatment effect of the treated is calculated, indicating the effect of participation as compared to households with similar characteristics.

Ordinary Least Squares

An Ordinary Least Squares model tests the hypothesis that participation in the redistribution program positively impacts welfare as measured by household expenditure. Household expenditure is measured as the log of household expenditure, as well as the log of per capita household expenditure. This allows for a more meaningful interpretation and results, as a one-dollar increase would mean a lot to the poor, but little to the rich. However, a one percent increase would be meaningful to both groups.

The simplest expression of the OLS regression is a bivariate expression written as:

$$\log(hhexpend)_i = \alpha + \beta_1 LG_i + \varepsilon_i$$

where *LG* is a binary variable with 1 indicating the household participates in the redistribution program. This equation does not fully explain the relationship between expenditure and redistribution due to an omitted variable bias. In order to control for other factors that may influence expenditure, a series of dummy variables are included. These will control for race, province of residence, gender, household size, survey year, HOH's age and the number of children under age 15 in the house:

$$\log(hhexpend)_i = \alpha + \beta_1 LG_i + \beta_2 race_i + \beta_3 prov_i$$
$$+ \beta_4 year_i + \beta_5 age_i + age_i^2 + \beta_6 male + \beta_7 hhsize_i + \beta_8 chld15_i + \varepsilon_i$$

While these controls help to explain expenditure in South Africa because of racial, regional, and age differences, they do not control for characteristics that may

effect a household's welfare position; such as education or reason for farming. Therefore, I include these controls in the following specification:

$$\log(hhexpend)_i = \alpha + \beta_1 LG_i + \beta_x X_i + \beta_9 education_i + \beta_{10} reason_i + \varepsilon_i$$

where *education* is a series of dummies about educational attainment, *reason* is a series of dummies capturing the main reason the household farms, and *X* is all other controls previously mentioned. This fully expressed regression model holds as many observed characteristics constant as possible, and should limit any bias to unobserved variables. However, there remains a concern that unobservable personal characteristics – such as motivation, and land quality – may be biasing the results.

Probit Models

As another avenue of analysis, food security and poverty are used as dependent variables. A probit model is necessary for this analysis as food security and poverty are binary variables, and the probit allows the relationship to be non-linear. Food security is measured with a binary variable where a 1 indicates households who report that they have trouble meeting their food needs sometimes, often, or always. Poverty is a binary variable with a 1 indicating that the household's per capita expenditure is below the poverty line of R322, as calculated by the Treasury of South Africa (Statistics South Africa, 2007).

The equations for these two models will follow the form of:

$$\Upsilon_i = \alpha + \beta_1 X_i + \varepsilon_i$$

where Υ_i is the probability of the value of the variable being 1 and X_i is the vector of determining factors. The probability of food security is measured by:

$$foodins_i = \alpha + \beta_1 LG_i + \beta_p personal_i + \beta_8 educ_i + \beta_9 male_i + \beta_{10} reason_i + \varepsilon_i$$

where: *foodins* is the measure of food insecurity, *personal* are controls of race, province, survey year, age, and gender and *reason* is the household's reason for farming.

The model of the probability of living in poverty is:

$$poverty_i = \alpha + \beta_1 LG_i + \beta_p personal_i + \beta_8 educ_i + \beta_9 male_i + \beta_{10} reason_i + \varepsilon_i$$

controlling for the same factors as above.

Propensity Score Match

In order to gain the most accurate estimate of participation's effect on food insecurity and poverty there needs to be a convincing counterfactual. Because the data is crossectional, it is unable to determine if the participant households are better off than before participation. Therefore, in order to construct the closest counterfactual I will use a propensity score match to pair and compare each treated

household with the untreated household that is most similar (Godtland, Sadoulet, De Janvry, Murgai, and Ortiz, 2004).

First, a probit model predicts the likelihood that a household would participate in the land grant program. Then, the predicted value of each household is calculated and each participant is matched with a non-participant using nearest neighbor matching (Deininger et al., 2004; Valente, 2009). Finally, the average treatment effect of the treated is calculated.

Following the above probit models, the predictor of participation in the land grant program is expressed as follows:

$$LG_i = \alpha + \beta_p personal_i + \beta_8 educ_i + \beta_9 male_i + \beta_{10} reason_i + \varepsilon_i$$

These variables are expected to explain participation in the land grant program. The model is specified in this manner as the program is targeted toward black participants who live in poverty. It is also probable that individuals with higher levels of education, and reasons for farming, such as for food or income, are more likely to participate in the program. Finally, the propensity score attempts to control for as many personal attributes as possible, therefore it is beneficial to include many determinants to get the closest match of participant and non-participant households as possible.

Using this model the predicted value of each household is given as:

$$\widehat{LG_i} = \alpha + \widehat{\beta_p} personal_i + \widehat{\beta_8} educ_i + \widehat{\beta_9} male_i + \widehat{\beta_{10}} reason_i$$

where $\widehat{\text{LG}}$ is the predicted value of participation in the land grant program for each household. The predicted value is then used as the propensity score for each household. Each participant household is matched with a non-participant household with the nearest propensity score (nearest neighbor matching) in absolute value.

The Average Treatment Effect on the Treated (ATE) is then calculated as the "expected difference in observed outcomes between participants and matched nonparticipants" (Francesconi and Heerink, 2011; Godtland et al., 2004). If the propensity scores are identical then the equation is:

$$E\left[y_1 - y_0 \middle| p(\widehat{LG})\right] = E\left[y \middle| LG = 1, p(\widehat{LG})\right] - E[y|LG = 0, p(\widehat{LG})]$$

where LG is the propensity score (or probability of participation), and *LG* is the indicator of treatment, and *y* is the dependent variable of interest (either food insecurity or poverty). Averaging over the distribution of expected values lends the average treatment effect of the treated:

$$ATE_1 = E\{E\left[y \middle| LG = 1, p(\widehat{LG})\right] - E\left[y \middle| LG = 0, p(\widehat{LG})\right]\}$$

This method allows for the construction of reasonable counterfactuals from which to compare participant households. It also attempts to control for as many personal characteristics as possible. However, unobservable personal

characteristics may still bias the results. Households may have identical observable characteristics, and still be different on characteristics such as motivation.

Results

Descriptive Statistics

The population is young and predominantly male (60%). Approximately 90% of the population is between the working ages of 18 and 69.

Table 1: Population Means

	Percent		Percent
Poverty	67.74	**Population Group**	
Male	60.48	African/Black	76.47
Female	39.52	Coloured	10.74
Working Age	89.85	Indian/Asian	2.15
Food Insecure	34.03	White	10.57
Household Size	4.21	Other	0.07
Household Expenditure		R 1,418	

Additionally, 76% of the sample is black, 39% are food insecure, and the average household has 4.2 members (See Table 1). Not surprisingly for a developing country, 90% of South Africans have less than a high school degree (Table 4). This low education level could be important if it is correlated with less agricultural knowledge or basic skills. More than half of households spend less than R 1,000 ($143) per month (see Table 3).

Of the sample 2.2% participates in the land grant program. Without a direct relation between how much land each participant receives per grant (as it depends on the size of the desired land) there is no way to correlate the percent of land redistributed (estimated at 5%) and the participation level (Valente, 2009). However, there is no reason to believe that the sample is not representative of participant households.

Table 2: Comparing Participant Means

	All Households		Black Households	
	Non-Partipant	Participant	Non-Partipant	Participant
Poverty	67.55	78.49	77.64	82.02
Male	60.51	58.06	56.19	55.99
Female	39.49	41.94	43.81	44.01
Working Age	89.86	89.52	89.67	89.3
Food Insecure	33.68	48.25	40.59	50.9
HH Size	4.21	4.53	4.33	4.57
HH Expend.	1426.61	1058.37	908.4	890.5222

Comparing participants with non-participant households, key characteristics are not much different. A greater proportion of participants in the program are black (89%) than the population as a whole. Eleven percent more participants are below the poverty line, and 15 percent more of participants are food insecure (see Table 2). With regard to expenditure, households that participate in the program are approximately 7 percentage points more likely to spend less than R1,000 than non-participants, though both groups are heavily weighted toward lower levels of expenditure. A lager share of participant HOH's have less than some secondary education. Perhaps most interestingly, participants are more equally divided between men and women heads of households (58/42) than non-participants (61/39). While the change is not large, it is an interesting fact to note.

Lower levels of household expenditure, and higher levels of poverty and food insecurity for participants indicate the program's targeting of the poor. As such, participants in the land grant program are less well off than non-participants.

Table 3: Household Expenditure

Household Expenditure Bins	Household Expenditure	Population		Land Grant Participants		Non-Participant	
		Percent	Cum.	Percent	Cum.	Percent	Cum.
0 - 399	**200**	28.51	28.51	32.38	32.38	28.4	28.4
400 - 799	**600**	29.89	58.4	32.38	64.76	29.85	58.26
800 - 1199	**1000**	13.8	72.2	14.57	79.34	13.78	72.04
1200 - 1799	**1500**	8.07	80.26	7.37	86.71	8.08	80.12
1800 - 2499	**2050**	5.88	86.14	4.9	91.61	5.91	86.02
2500 - 4999	**3750**	7.49	93.63	5.5	97.1	7.53	93.55
5000 - 9999	**7500**	4.6	98.23	2.13	99.23	4.65	98.21
10000 +	**10000**	1.77	100	0.77	100	1.79	100
				Black Households			
Household Expenditure Bins	**Household Expenditure**	**Population**		**Participants**		**Non-participants**	
		Percent	Cum.	Percent	Cum.	Percent	Cum.
0 - 399	**200**	28.51	28.51	34.53	34.53	34.38	34.38
400 - 799	**600**	29.89	58.4	33.9	68.42	34.17	68.55
800 - 1199	**1000**	13.8	72.2	14.6	83.03	14.13	82.68
1200 - 1799	**1500**	8.07	80.26	7.06	90.09	7.16	89.85
1800 - 2499	**2050**	5.88	86.14	4.06	94.15	4.22	94.07
2500 - 4999	**3750**	7.49	93.63	4.35	98.5	4.11	98.17
5000 - 9999	**7500**	4.6	98.23	1.21	99.71	1.49	99.66
10000 +	**10000**	1.77	100	0.29	100	0.34	100

Table 4: Comparing Participants and Non-Participants

	Government Land Grant		
	Non-Participants	Participants	Total
Reason for farming			
As a main source of food	1.77	2.18	1.78
As the main source of Income	0.91	2.35	0.95
As an extra source of Income	0.83	1.63	0.85
As an extra source of Food	13.56	11.1	13.5
As a leisure activity	0.8	0.67	0.8
Not applicable	82.13	82.07	82.13
Main source of income			
Salaries and/or wages	56.79	52.92	56.7
Remittances	13.11	12.41	13.1
Pensions and grants	21.74	23.93	21.79
Sales of farm product	1.03	1.84	1.05
Other non-farm income	5.36	6.6	5.39
No income	1.88	2.17	1.89
Unspecified	0.08	0.13	0.08
Educational Attainment			
No School	17.3	21.3	17.39
Some Primary	30.6	34.9	30.69
Some Secondary	42.52	39.03	42.44
High School Degree	0.89	0.3	0.87
Some College	4.55	1.96	4.49
Graduate	2.08	1.24	2.06
Post Graduate	2.07	1.28	2.06

Ordinary Least Squares

The regression analysis suggests that participants are not receiving benefits of higher household expenditure through their participation in the land grant program (Table 5). Without controls in regression (Column 1) participants spend an average of 18% less than non-participants. Without controls however, this could simply be because participants are poorer than non-participants to begin with. Once additional controls are included, participation in the program remains negative but smaller in magnitude, though not statistically significant. Spending increases slightly with age, as well as with each additional person living in the household, though children under 15 reduce expenditure, perhaps reflecting their smaller monetary demands for essentials (Column 2). Each reason for farming is positive when compared with the omitted source of food (Column 3). This suggests that farming as a source of food might reduce expenditure. This would follow if households reduce spending by the amount of food not purchased. All race variables are positive, suggesting all races spend more than black households. Province coefficients are also all negative, reflecting that the omitted Western Cape is the richest province in the country.

In order to examine expenditure thoroughly, regressions were also run using per capita expenditure as the dependent variable (Table 5, Columns 4-6). Following the same pattern participation is initially negative and becomes smaller in magnitude. However, with per capita expenditure as the dependent variable, the coefficient on participation is statistically significant from zero. This indicates that participants spend less than non-participants; or participants are not benefiting

Table 5: Regression Results of Land Grant on Household Expenditure

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Log of Household Expenditure			Log Per Capita Household Expenditure		
Government Land grant	-0.188***	-0.0250	-0.0230	-0.308***	-0.0830***	-0.0841***
	(0.0204)	(0.0188)	(0.0177)	(0.0229)	(0.0200)	(0.0190)
Age		0.0274***	0.0346***		0.00347***	0.0111***
		(0.000887)	(0.000864)		(0.000957)	(0.000941)
Age Squared		-0.000267***	-0.000268***		-9.15e-05***	-9.48e-05***
		(8.51e-06)	(8.25e-06)		(9.18e-06)	(8.99e-06)
Male		0.212***	0.194***		0.197***	0.180***
		(0.00572)	(0.00527)			
Num. People in Household		0.0535***	0.0606***			
		(0.00163)	(0.00155)		(0.00619)	(0.00578)
Num. Children under age 15		-0.0156***	-0.0120***		-0.134***	-0.124***
		(0.00140)	(0.00131)		(0.00110)	(0.00106)
Some Primary Education			0.0795***			0.0961***
			(0.00696)			(0.00794)
Some Secondary Education			0.501***			0.493***
			(0.00788)			(0.00881)
High School Degree			1.323***			1.289***
			(0.0155)			(0.0165)
Some College			1.014***			0.967***
			(0.0331)			(0.0344)
College Degree			1.490***			1.474***
			(0.0214)			(0.0226)
Graduate Studies			1.489***			1.520***
			(0.0208)			(0.0222)
Farming as: Source of Income			0.265***			0.282***
			(0.0330)			(0.0354)
Farming as: Extra Income			0.298***			0.298***
			(0.0326)			(0.0360)
Farming as: Extra Food			0.221***			0.192***
			(0.0179)			(0.0201)

Table 5: Regression Results of Land Grant on Household Expenditure (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Log of Household Expenditure			Log Per Capita Household Expenditure		
Farming as: Hobby			0.308***			0.303***
			(0.0335)			(0.0361)
Farming: Not Applicable			0.295***			0.339***
			(0.0172)			(0.0194)
Constant	6.608***	5.412***	4.452***	5.253***	5.381***	4.383***
	(0.00338)	(0.0243)	(0.0304)	(0.00390)	(0.0264)	(0.0334)
Observations	106,064	105,819	103,873	106,064	105,819	103,873
R-squared	0.001	0.334	0.430	0.001	0.417	0.488

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Race, Province, Year omitted from output, see Appendix I for full results

from the government program.

Probit

Positive results of participation in the land grant program on food insecurity are consistent with the Valente (2009) study. (See Table 6, Appendix II) Participation in the land grant program increases the probability that the household will be food insecure by approximately fifteen percentage points (Column 1). However, this could simply be an indicator of the poverty of those most likely to participate in the program. Yet the inclusion of further determinants (race province, gender, and reason for farming) still returns positive results to participation on food insecurity (Column 2). While the probability is reduced from fifteen percentage points more to six percentage points more, it is still surprising that participants would be so much less food secure.

A possible explanation is that those who are participating in the program as a source of food are more vulnerable to the swings in agriculture fortunes. Given the uncertain nature of crop yields, these households' food security would be more exposed to volatile changes in food production. This is shown in Table 6, as those farming for a source of food are approximately 8 percentage points more likely to be food insecure than those farming for other reasons. However, it is unlikely that this explains the entire result suggesting that participants are less food secure as a result of participation, or an unobserved difference.

The probit model predicting the likelihood of experiencing poverty of those participating in the land grant program indicates that participation does not increase the probability of being in poverty. Alone, participation would increase the

Table 6: Marginal Effects from Probit Models

	Food Insecurity (1)		Food Insecurity (2)		Poverty (1)		Poverty (2)	
	Margin	Std. Error	Margin	Std. Error	Margin	Std. Error	Margin	Std Error
Non-Participant	0.337	0.001	0.341	0.001	0.676	0.001	0.683	0.001
Participant	0.482	0.010	0.409	0.009	0.785	0.008	0.697	0.008
African/Black			0.387	0.002			0.745	0.001
Coloured			0.215	0.005			0.631	0.005
Indian/Asian			0.133	0.008			0.416	0.009
White			0.071	0.004			0.312	0.006
Other			0.137	0.043			0.355	0.054
Western Cape			0.317	0.006			0.652	0.004
Eastern Cape			0.476	0.004			0.735	0.003
Northern Cape			0.386	0.007			0.729	0.005
Free State			0.342	0.005			0.689	0.004
KwaZulu-Natal			0.325	0.003			0.672	0.003
North West			0.358	0.004			0.681	0.004
Guateng			0.257	0.004			0.637	0.003
Mpumalanga			0.344	0.005			0.674	0.004
Limpopo			0.296	0.004			0.734	0.003
2001			0.410	0.003			0.689	0.002
2002			0.354	0.003			0.696	0.002
2003			0.283	0.003			0.680	0.002
2004			0.324	0.003			0.672	0.002
No School			0.430	0.004			0.806	0.003
Some Primary Education			0.389	0.003			0.775	0.002
Some Secondary Education			0.298	0.002			0.646	0.002
High School Degree			0.168	0.017			0.489	0.018
Some College			0.146	0.006			0.368	0.007
College Degree			0.098	0.009			0.295	0.012
Graduate Studies			0.102	0.008			0.301	0.011
Source of Food			0.447	0.010			0.766	0.010
Source of Income			0.367	0.016			0.708	0.013
Extra Income			0.297	0.014			0.703	0.015
Extra Food			0.358	0.004			0.742	0.004
Hobby			0.279	0.015			0.673	0.013
No Farm			0.338	0.002			0.676	0.001

Note: For Probit results see Appendix II
Note: Marginal effects are differences between categories.

Table 7: Marginal Effects, Receiving a Land Grant

	Margin	Std. Err.
NRace		
African/Black	0.026	0.001
Coloured	0.013	0.001
Indian/Asian	0.007	0.002
White	0.006	0.001
Other	0.011	0.011
Province		
Western Cape	0.023	0.002
Eastern Cape	0.027	0.001
Northern Cape	0.046	0.003
Free State	0.005	0.001
KwaZulu-Natal	0.009	0.001
North West	0.021	0.001
Guateng	0.015	0.001
Mpumalanga	0.073	0.003
Limpopo	0.013	0.001
Survey Year		
2001	0.025	0.001
2002	0.020	0.001
2003	0.012	0.001
2004	0.030	0.001
Education		
No School	0.020	0.001
Some Primary Education	0.022	0.001
Some Secondary Education	0.024	0.001
High School Degree	0.016	0.006
Some College	0.015	0.002
College Degree	0.024	0.004
Graduate Studies	0.019	0.003
Reason		
Source of Food	0.022	0.003
Source of Income	0.071	0.009
Extra Income	0.034	0.005
Extra Food	0.016	0.001
Hobby	0.016	0.004
No Farm	0.023	0.001
Gender		
Male	0.022	0.001
Female	0.022	0.001

Note: For Full Probit results see Appendix III

probability by 11 percentage points, however when controlling for race and region the marginal effects are only 1 percentage point above non-participants. However it is not statistically different from zero. Thus, participating in the land grant program does not increase the likelihood of being in poverty, though neither does participation reduce the likelihood.

Propensity Score Match

The probit depicting the probability that a household receives a land grant suggests that higher levels of education generally make it more likely that the household participates. Participation is also more likely as the HOH gets older, and households that rely on farming for food or income are more likely to participate in the program.

Table 8: Average Treatment of Treated, Food Insecurity and Poverty

Variable	Sample	Participants	Non-Participants	Difference	S.E.
Food Insecurity	Unmatched	0.4852	0.3395	0.1457	0.0099
	ATT	0.4852	0.4064	0.0788	0.0148
Poverty	Unmatched	0.7901	0.6808	0.1094	0.0097
	ATT	0.7901	0.7512	0.0390	0.0126

The results of the propensity score match display that the redistribution program in South Africa is not benefiting participants. The average treatment effect of the treated is approximately 8 percentage points higher than the non-treated (Table 8). This indicates that participants are 8 percentage points more likely to be food insecure than non-participants. The same model on the poverty indicator also

yields that participants are 3 percentage points more likely to live below the poverty line than non-participants. However, it could be that unobservable are correlated with participation in the land grant program. This could potentially negatively bias the results of the study. This would suggest that participants would be better off if they were to direct their efforts towards other means of improving their livelihoods.

Discussion

Negative benefits to participation could be the result of limited state assistance to new farmers. South Africa is unique in that many of the participants of its land reform program have never farmed – at least on a commercial scale. In Zimbabwe, it was found that the provision of extension services (education in planning, harvesting, markets) resulted in double-digit gains in output and income (Owens, Hoddinott, & Kinsey, 2003). However, in South Africa these services are rarely provided, either from lack of political will or funding (Deininger, 1999; Lahiff, 2007). While extension services are no panacea, it could aid in reducing negative experiences.

The presence of unobserved differences between participants and non-participants are biasing the results. Due to data limitations discussed earlier, mainly that the data set is not constructed to study the land grant program, unobservable characteristics may present in the errors correlating with participation in the land grant program. This in turn would bias the results to the study. Possible characteristics that should be included in further research are: land quality, whether the participant is in a CPA, the CPA's size, time spent farming, CPA meetings

attended, farm specific spending, and importance of participation, among others. The inclusion of these characteristics would allow for a more complete control or matching of participant and non-participant characteristics in order to see the 'true' effect of participation in the land grant program.

The negative results on household expenditure, food security and poverty, could also be a result of several factors of program design. First, the best land in South Africa has not been transferred as part of the program. Second, it is possible that many households are not putting in the effort needed on the farm. Only two percent of grant recipients receive their main source of income from farming, and most participants are not farming at all suggesting that there are limited incentives to put forth full effort to farm (Table 4, Main Source of Income). Finally, the size of the CPAs may be limiting the effectiveness of the projects. Some groups included more than 400 members (Lahiff, 2007; McCusker, 2002). The collective nature also resulted in non-participation and difficulties in making decisions. While it is not known why people do not participate, in several case studies (Bradstock, 2005; Lahiff, 2007; Valente, 2011) it was found that there were some participants who were enticed by program leaders for their grant money. It is also thought that after a certain period of little or no returns, and general frustration, that some households choose to give up on their farmland. However, due to the contract of the CPAs, some participants may still be required to make financial contributions to the projects.

Conclusion

The literature finds evidence that land reform programs in developing countries work to improve the income and welfare of participants. A study of South Africa's program in 2009 found the opposite with regard to food security. This paper provides further evidence that such a negative relationship exists within South Africa's program.

The econometric approach of this paper has covered several key topics. First, OLS regressions found that participants in the land redistribution program spent less on average than non-participants. This was found to hold true in probit analysis of living below the poverty line, as well as having trouble meeting food needs (food insecurity). Results of this study are limited by the data limitations. The inability to control for unobservable characteristics of participants and land, as well as the construction of household expenditure prevents determining a causal link. These limits might also bias the results of the study. Thus, I cannot rule out that the error terms are correlated with participation, and that the negative results are driven by unobservable characteristics of participants.

South Africa's program is not providing benefits to participants in the form of increased household expenditure or reduced food insecurity. This may be due to the quality of land transferred, the size of collective organizations, or lingering contractual obligations. Whatever the reason for the negative results, the government of South Africa should reform the operations of the program to address such issues if redistribution is expected to positively benefit program participants.

Further research in this area should focus on creating a comprehensive data set that would allow for before/after comparison, or a more complete picture of participant households. This would allow for deeper comparisons of determinants of participation in the land grant program and its effects. More detailed surveys pertaining to this question would include observations of land use, hours spent working, other occupations and time constraints. They might also include crop type, CPA group size, and access to extension services. These variables would enable a more detailed study of participation that might pinpoint why the program does not appear to benefit participants.

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Appendix I: Regression Results of Land Grant on Household Expenditure

VARIABLES	(1)	(2)	(3)	(1)	(2)	(3)
	Log of Household Expenditure			Log Per Capita Household Expenditure		
Government Land grant	-0.188***	-0.0250	-0.0230	-0.308***	-0.0830***	-0.0841***
	(0.0204)	(0.0188)	(0.0177)	(0.0229)	(0.0200)	(0.0190)
White		1.778***	1.263***		1.806***	1.291***
		(0.00941)	(0.0108)		(0.00977)	(0.0111)
Coloured		0.472***	0.423***		0.330***	0.279***
		(0.0122)	(0.0113)		(0.0128)	(0.0119)
Indian/Asian		1.342***	1.042***		1.151***	0.847***
		(0.0192)	(0.0189)		(0.0199)	(0.0194)
Race Other		1.431***	0.970***		1.391***	0.930***
		(0.104)	(0.104)		(0.114)	(0.110)
Eastern Cape		-0.284***	-0.263***		-0.254***	-0.221***
		(0.0127)	(0.0120)		(0.0134)	(0.0127)
Northern Cape		-0.325***	-0.240***		-0.271***	-0.188***
		(0.0151)	(0.0141)		(0.0161)	(0.0152)
Free State		-0.140***	-0.0899***		-0.104***	-0.0519***
		(0.0141)	(0.0133)		(0.0151)	(0.0144)
KwaZulu-Natal		-0.124***	-0.0720***		-0.106***	-0.0465***
		(0.0126)	(0.0119)		(0.0134)	(0.0127)
North West		-0.157***	-0.135***		-0.125***	-0.104***
		(0.0141)	(0.0133)		(0.0151)	(0.0143)
Guateng		0.0649***	0.0125		0.101***	0.0497***
		(0.0131)	(0.0124)		(0.0138)	(0.0133)
Mpumalanga		-0.109***	-0.0492***		-0.104***	-0.0389***
		(0.0144)	(0.0136)		(0.0153)	(0.0145)
Limpopo		-0.262***	-0.252***		-0.236***	-0.211***
		(0.0136)	(0.0128)		(0.0146)	(0.0138)
2002		0.0627***	0.0495***		-0.0398***	-0.0534***
		(0.00784)	(0.00724)		(0.00845)	(0.00794)
2003		0.202***	0.181***		0.0663***	0.0451***
		(0.00774)	(0.00717)		(0.00839)	(0.00790)
2004		0.228***	0.221***		0.00484	0.000255

Appendix I: Regression Results of Land Grant on Household Expenditure (cont)

	(1)	(2)	(3)	(1)	(2)	(3)
VARIABLES	Log of Household Expenditure			Log Per Capita Household Expenditure		
		(0.00777)	(0.00729)		(0.00835)	(0.00794)
Age		0.0274***	0.0346***		0.00347***	0.0111***
		(0.000887)	(0.000864)		(0.000957)	(0.000941)
Age Squared		-0.000267***	-0.000268***		-9.15e-05***	-9.48e-05***
		(8.51e-06)	(8.25e-06)		(9.18e-06)	(8.99e-06)
Male		0.212***	0.194***		0.197***	0.180***
		(0.00572)	(0.00527)		(0.00619)	(0.00578)
Num. People in Household		0.0535***	0.0606***			
		(0.00163)	(0.00155)			
Num. Children under age 15		-0.0156***	-0.0120***		-0.134***	-0.124***
		(0.00140)	(0.00131)		(0.00110)	(0.00106)
Some Primary Education			0.0795***			0.0961***
			(0.00696)			(0.00794)
Some Secondary Education			0.501***			0.493***
			(0.00788)			(0.00881)
High School Degree			1.323***			1.289***
			(0.0155)			(0.0165)
Some College			1.014***			0.967***
			(0.0331)			(0.0344)
College Degree			1.490***			1.474***
			(0.0214)			(0.0226)
Graduate Studies			1.489***			1.520***
			(0.0208)			(0.0222)
Farming as: Source of Income			0.265***			0.282***
			(0.0330)			(0.0354)
Farming as: Extra Income			0.298***			0.298***
			(0.0326)			(0.0360)
Farming as: Extra Food			0.221***			0.192***
			(0.0179)			(0.0201)
Farming as: Hobby			0.308***			0.303***
			(0.0335)			(0.0361)
Farming: Not Applicable			0.295***			0.339***

Appendix I: Regression Results of Land Grant on Household Expenditure (cont)

VARIABLES	(1)	(2)	(3)	(1)	(2)	(3)
	Log of Household Expenditure			Log Per Capita Household Expenditure		
			(0.0172)			(0.0194)
Constant	6.608***	5.412***	4.452***	5.253***	5.381***	4.383***
	(0.00338)	(0.0243)	(0.0304)	(0.00390)	(0.0264)	(0.0334)
Observations	106,064	105,819	103,873	106,064	105,819	103,873
R-squared	0.001	0.334	0.430	0.001	0.417	0.488

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix II: Probit Results Food Insecurity, Poverty

Variables	(1) Food Insecurity	(2) Food Insecurity	(3) poverty	(4) Poverty
Government Land Grant	0.377***	0.210***	0.334***	0.0630*
	(0.0259)	(0.0279)	(0.0290)	(0.0352)
Coloured		-0.552***		-0.438***
		(0.0189)		(0.0195)
Indian/Asian		-0.905***		-1.187***
		(0.0411)		(0.0338)
White		-1.294***		-1.574***
		(0.0291)		(0.0222)
Other		-0.885***		-1.409***
		(0.212)		(0.202)
Eastern Cape		0.481***		0.372***
		(0.0211)		(0.0226)
Northern Cape		0.214***		0.343***
		(0.0240)		(0.0252)
Free State		0.0792***		0.158***
		(0.0234)		(0.0242)
KwaZulu-Natal		0.0260		0.0822***
		(0.0214)		(0.0222)
North West		0.127***		0.122***
		(0.0229)		(0.0241)
Guateng		-0.202***		-0.0655***
		(0.0226)		(0.0220)
Mpumalanga		0.0862***		0.0929***
		(0.0237)		(0.0256)
Limpopo		-0.0697***		0.367***
		(0.0229)		(0.0253)
2002		-0.173***		0.0336**
		(0.0120)		(0.0145)
2003		-0.405***		-0.0389***
		(0.0121)		(0.0140)
2004		-0.268***		-0.0750***
		(0.0122)		(0.0141)
Age		-0.000237		-0.0522***
		(0.00150)		(0.00198)
Age Squared		-3.27e-05**		0.000461***
		(1.44e-05)		(2.04e-05)
Male		-0.164***		-0.302***
		(0.00886)		(0.0106)
Num. People in Household		0.0430***		0.247***
		(0.00255)		(0.00469)
Num. Children under age 15		0.00661***		-0.0105***
		(0.00220)		(0.00371)
Some Primary Education		-0.121***		-0.149***
		(0.0125)		(0.0177)
Some Secondary Education		-0.400***		-0.682***
		(0.0135)		(0.0178)

Appendix II: Probit Results Food Insecurity, Poverty (cont)

Variables	(1) Food Insecurity	(2) Food Insecurity	(3) poverty	(4) Poverty
High School Degree		-0.880***		-1.234***
		(0.0758)		(0.0635)
Some College		-0.979***		-1.652***
		(0.0295)		(0.0293)
College Degree		-1.239***		-1.928***
		(0.0552)		(0.0487)
Graduate Studies		-1.216***		-1.903***
		(0.0515)		(0.0444)
Farming as: Source of Income		-0.246***		-0.286***
		(0.0584)		(0.0781)
Farming as: Extra Income		-0.471***		-0.309***
		(0.0554)		(0.0843)
Farming as: Extra Food		-0.275***		-0.124**
		(0.0327)		(0.0549)
Farming as: Hobby		-0.532***		-0.442***
		(0.0604)		(0.0770)
Farming: Not Applicable		-0.336***		-0.430***
		(0.0314)		(0.0524)
Constant	-0.421***	0.442***	0.455***	2.158***
	(0.00397)	(0.0536)	(0.00399)	(0.0747)
Observations	108,784	106,360	108,784	106,360

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix III: Probit Results, Receiving a Land Grant

Variables	(1) Land Grant
Coloured	-0.301***
	(0.0402)
Indian/Asian	-0.574***
	(0.125)
White	-0.636***
	(0.0501)
Other	-0.376
	(0.407)
Eastern Cape	0.0590
	(0.0440)
Northern Cape	0.313***
	(0.0442)
Free State	-0.594***
	(0.0652)
KwaZulu-Natal	-0.403***
	(0.0486)
North West	-0.0517
	(0.0475)
Guateng	-0.185***
	(0.0472)
Mpumalanga	0.558***
	(0.0439)
Limpopo	-0.243***
	(0.0503)
2002	-0.0941***
	(0.0252)
2003	-0.302***
	(0.0277)
2004	0.0959***
	(0.0240)
Age	0.0210***
	(0.00345)
Age Squared	-0.000169***
	(3.33e-05)
Male	0.0106
	(0.0190)

Appendix III: Probit Results, Receiving a Land Grant

Variables	(1) Land Grant
Num. People in Household	0.00331
	(0.00508)
Num. Children under age 15	0.00557
	(0.00462)
Some Primary Education	0.0473*
	(0.0268)
Some Secondary Education	0.0774***
	(0.0286)
High School Degree	-0.100
	(0.152)
Some College	-0.118*
	(0.0642)
College Degree	0.0755
	(0.0837)
Graduate Studies	-0.0173
	(0.0808)
Farming as: Source of Income	0.579***
	(0.0962)
Farming as: Extra Income	0.192*
	(0.102)
Farming as: Extra Food	-0.159**
	(0.0689)
Farming as: Hobby	-0.152
	(0.134)
Farming: Not Applicable	0.00621
	(0.0653)
Constant	-2.513***
	(0.117)
Observations	106,360

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1